Are we forgetting our fish spawning aggregations?

Institutional amnesia and shifting baselines.

Stuart Fulton


Arrecife rocoso y coralino
(Golfo de México)
Rocky reef and coral reef (Gulf of Mexico)
Arrecife coralino (Mesoamericano)
Coral reef (Mesoamerica)
Communities
Bosque de sargazo gigante
(Océano Pacífico)
Kefp fo,es,(Pacific Ocean)
Rocky reef (Gulf ot California)

Content

- What are fish spawning aggregations?
- Why are they important?
- The MAR´s fish spawning aggregations
- Shifting baselines
- Historical memories
- Institutional amnesia – what is it and how does it affect our work?
- What can we do about it?

Many fish form spawning aggregations

Spawning aggregations are massive concentrations of fish that form for the purpose of reproduction.

They occur at specific times, places and moments:

- Time of the year

- Moon phases

-Biophysical characteristics of the site (bottom relief and depth)

❼ 300 species of fish belonging to 44 families

Types of spawning aggregations

Transitory

Fish migrate long distances

Brief (days-weeks)

Specific times of the year

Higher predators

Resident

Fish travel short distances

They last for months or all year

Close to/inside its range

Ecosystem importance

They are temporary pockets of productivity that impact food networks.

There are high concentrations of food resources in the aggregations.

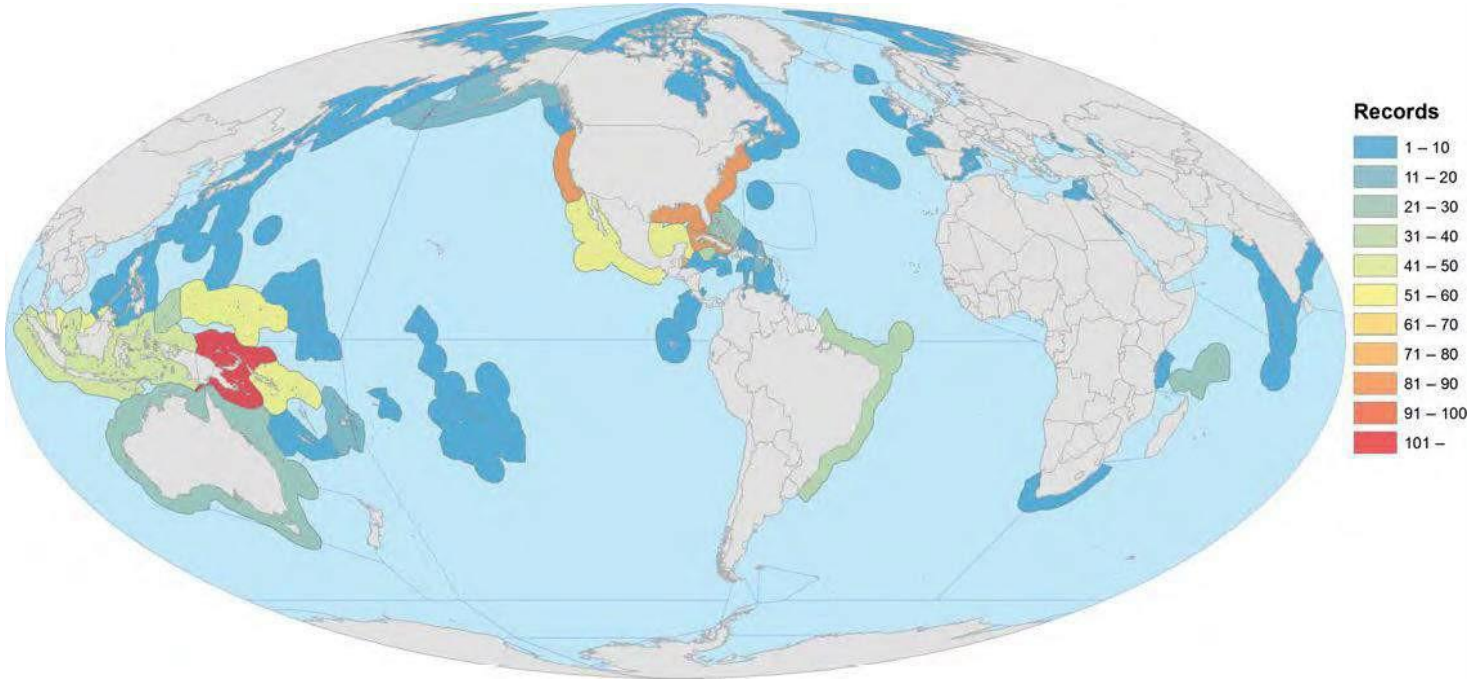
Stability, structure, function and health of reef ecosystems.

They are associated with synchronized migrations of large predators

Some animals feed on fish eggs.

Worldwide FSAs

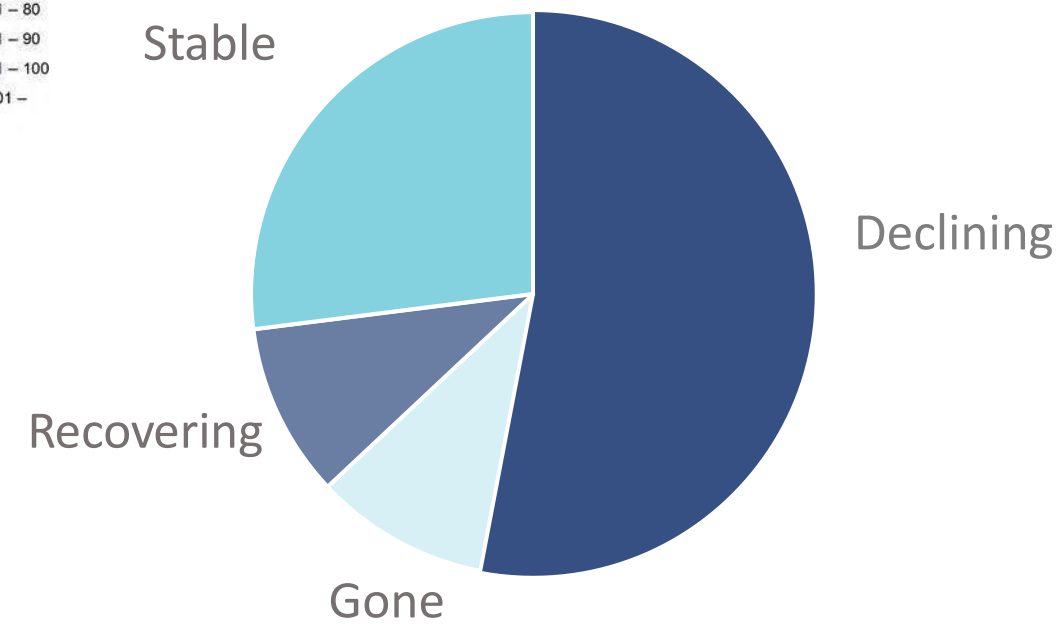
FSA have been observed in almost all marine regions and habitat types

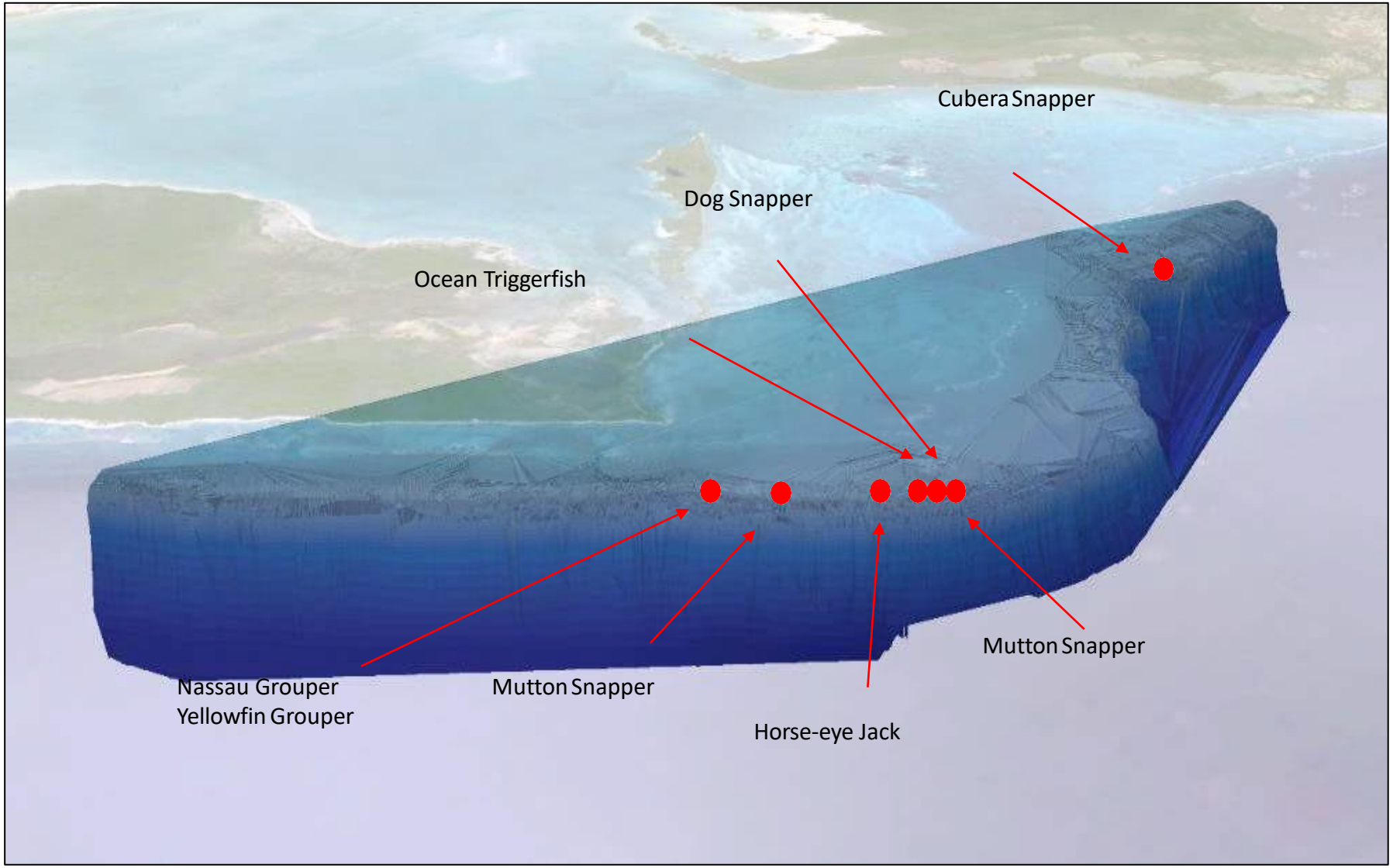


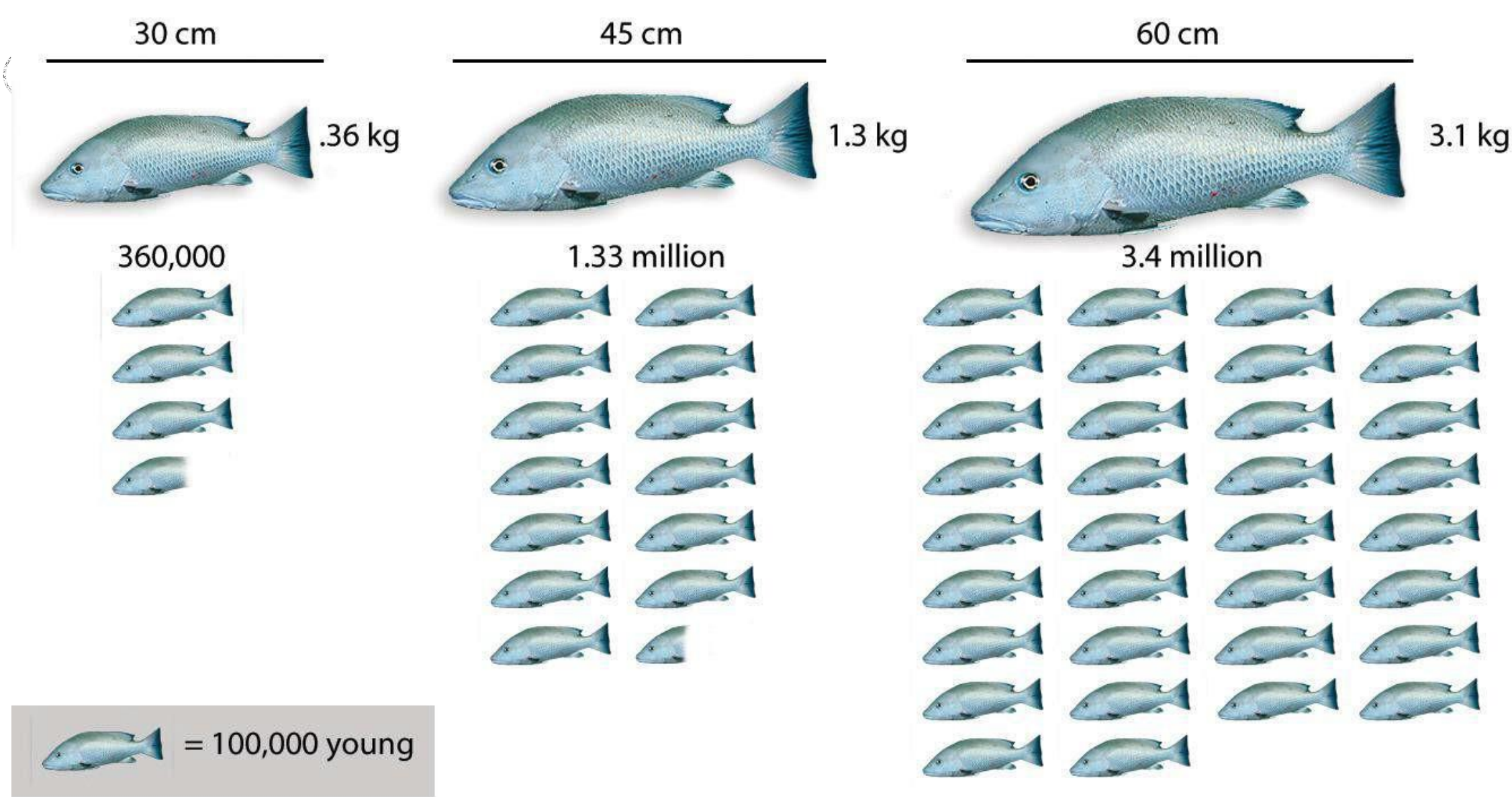
52% of fish aggregations have not been evaluated

<35% of fish aggregations are protected

Only 25% of aggregations are monitored



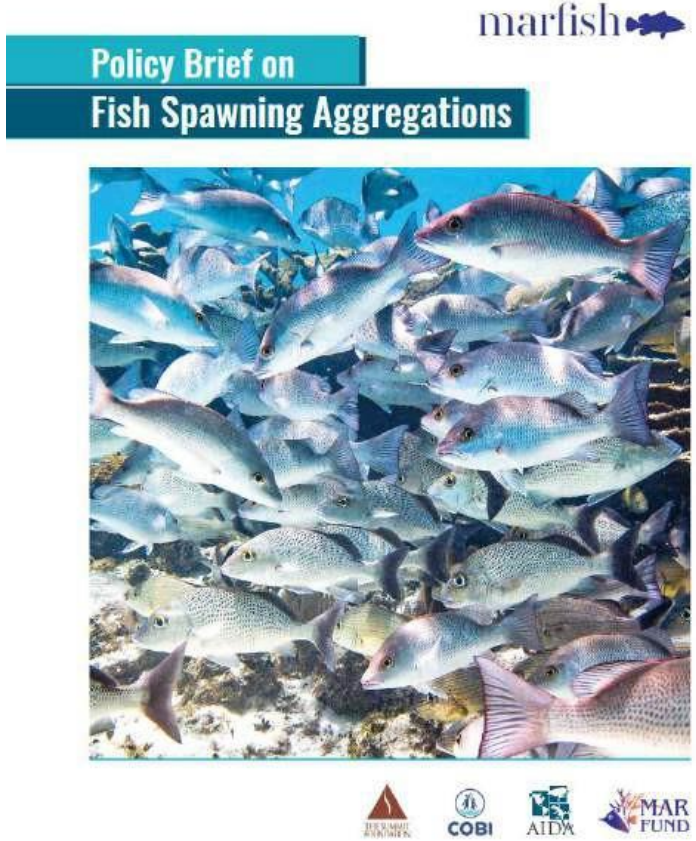

Cubera Snapper
Dog Snapper
Ocean Triggerfish
Mutton Snapper
Nassau Grouper
Yellowfin Grouper
Mutton Snapper
Horse-eye Jack

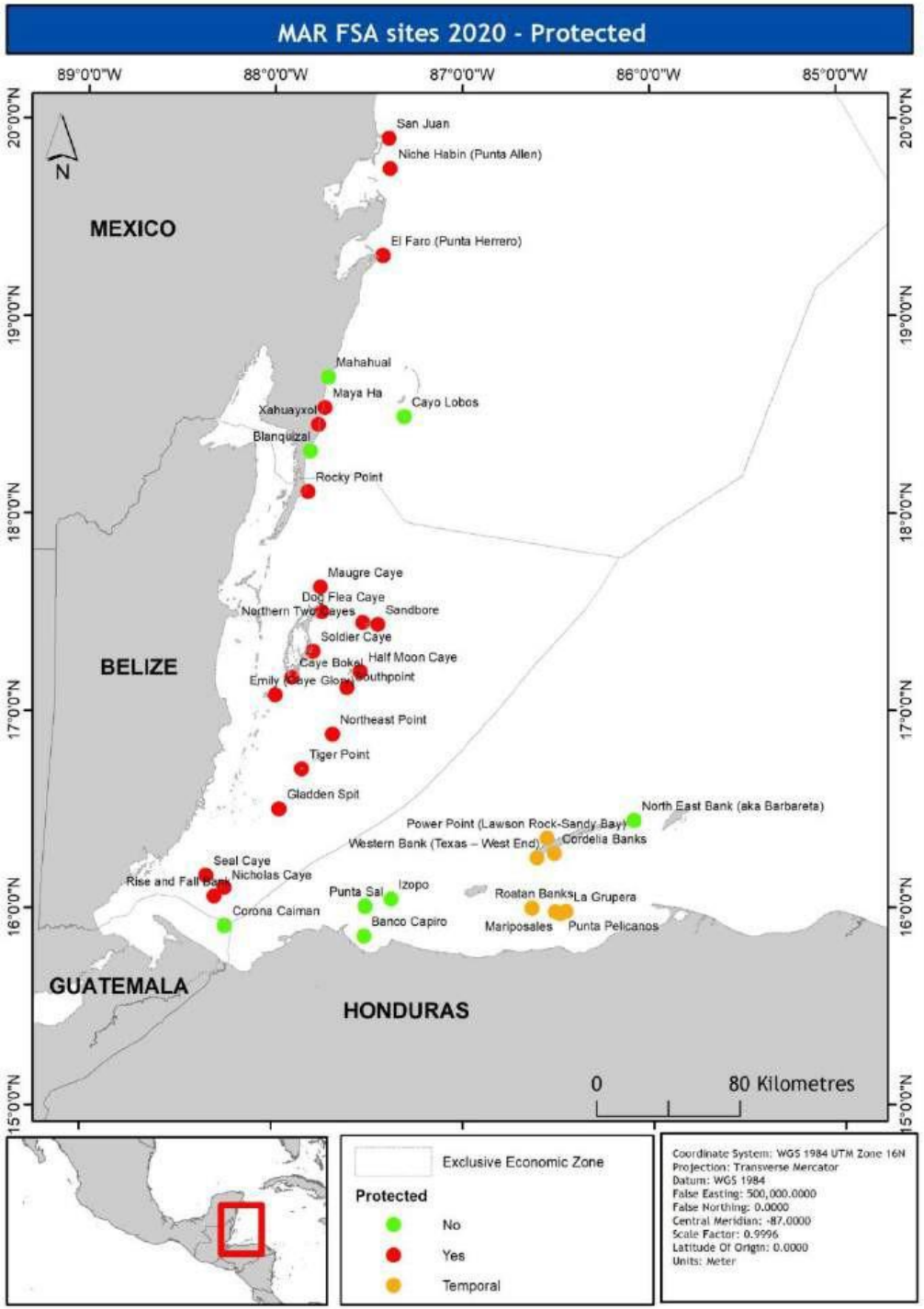


Average numbers of young produced by three different sizes of gray snapper.
Data: Bortone & Williams (1986) US Fish and Wildlife Service Biological Report

Regional activities

- Standardization of monitoring protocols
- Status report on FSAs
- Multistakeholder workshops
- Policy brief




MAR FSA sites 2020 - Protected
89°0'0"W
88°0'0"W
87°0'0"W
86°0'0"W
85°0'0"W
20°0'0"N
19°0'0"N
18°0'0"N
17°0'0"N
16°0'0"N
15°0'0"N
N
MEXICO
BELIZE
GUATEMALA
HONDURAS
San Juan
Niche Habin (Punta Allen)
El Faro (Punta Herrero)
Mahahual
Maya Ha
Cayo Lobos
Xahuayxol
Blanquizal
Rocky Point
Maugre Caye
Dog Flea Caye
Northern Two Cayes
Sandbore
Soldier Caye
Caye Bokel
Half Moon Caye
Emily Caye
Glory
Southpoint
Northeast Point
Tiger Point
Gladden Spit
North East Bank (aka Barbareta)
Power Point (Lawson Rock-Sandy Bay)
Western Bank (Texas – West End)
Cordelia Banks
Seal Caye
Rise and Fall Bank
Nicholas Caye
Punta Sal
Izopo
Roatan Banks
La Grupera
Corona Caiman
Banco Capiro
Mariposales
Punta Pelicanos
0
80 Kilometres
Exclusive Economic Zone
Protected
No
Yes
Temporal
Coordinate System: WGS 1984 UTM Zone 16N
Projection: Transverse Mercator
Datum: WGS 1984
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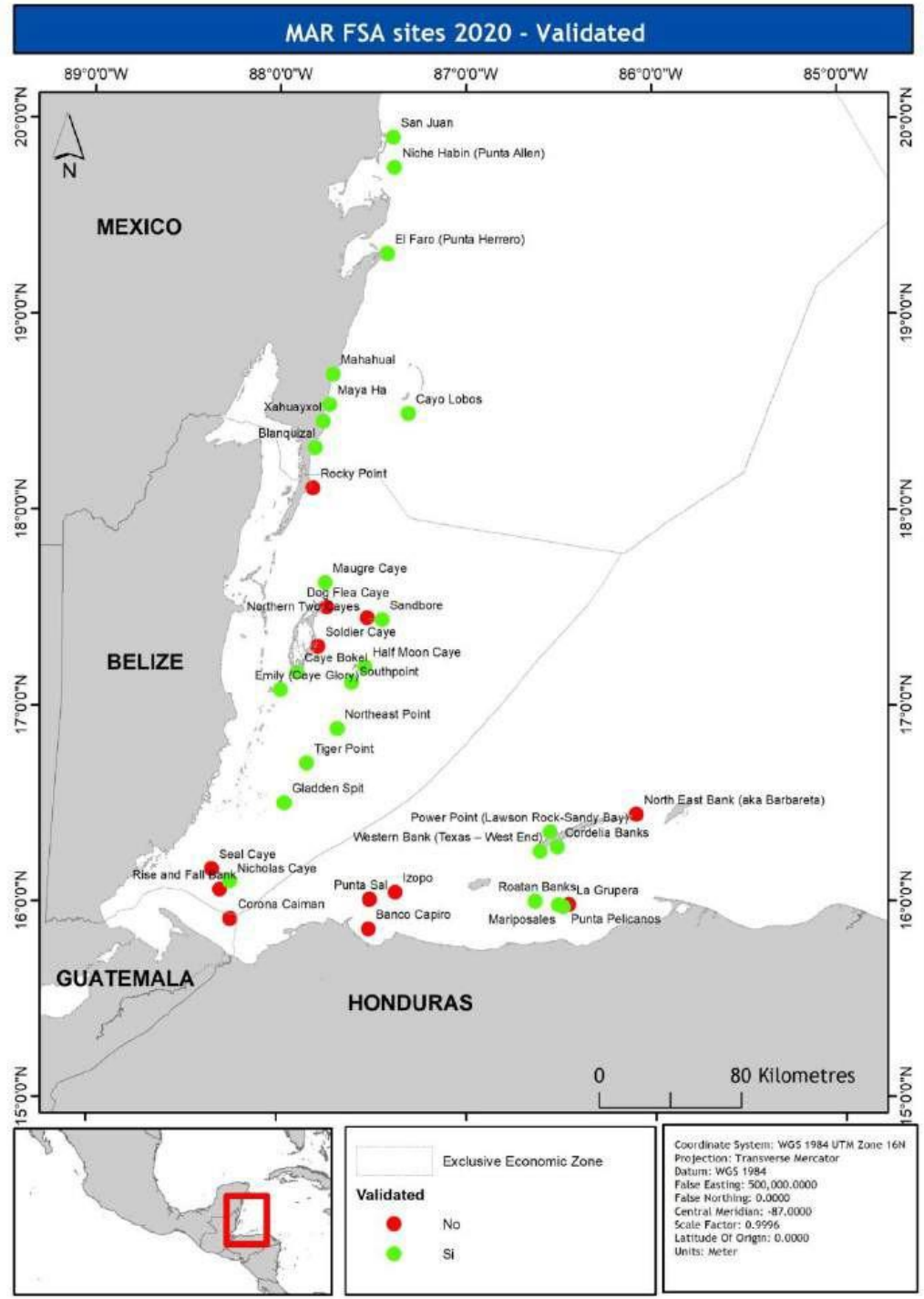
False Northing: 0.0000
Central Meridian: -87.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter


MAR FSA sites 2020 - Validated
89°0'0"W
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19°0'0"N
18°0'0"N
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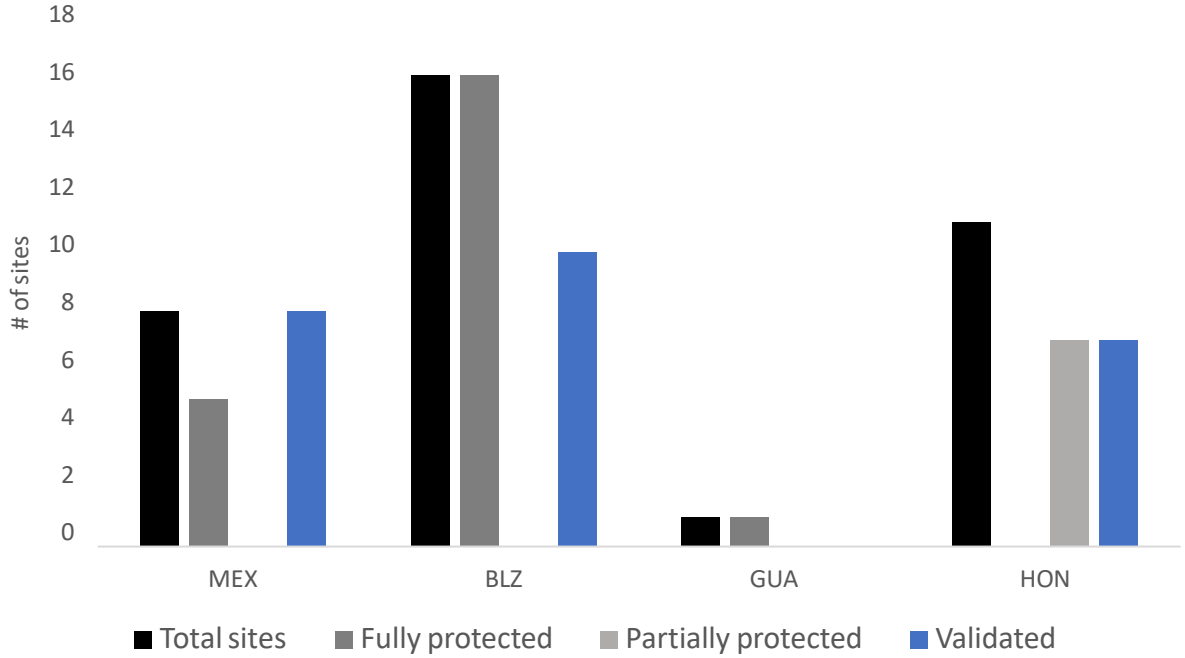
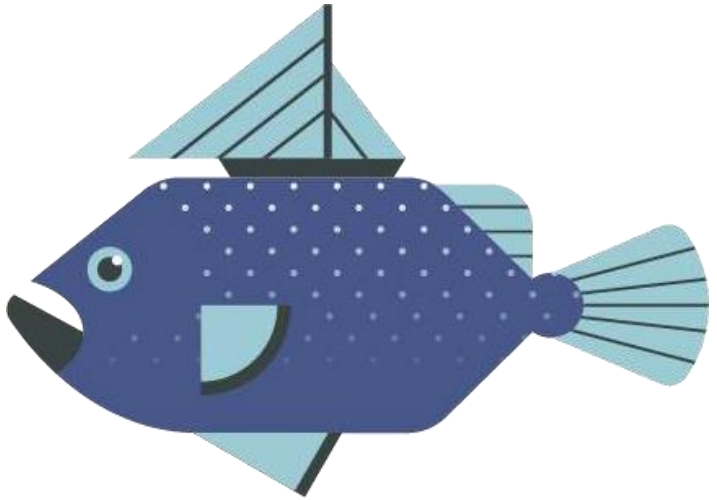
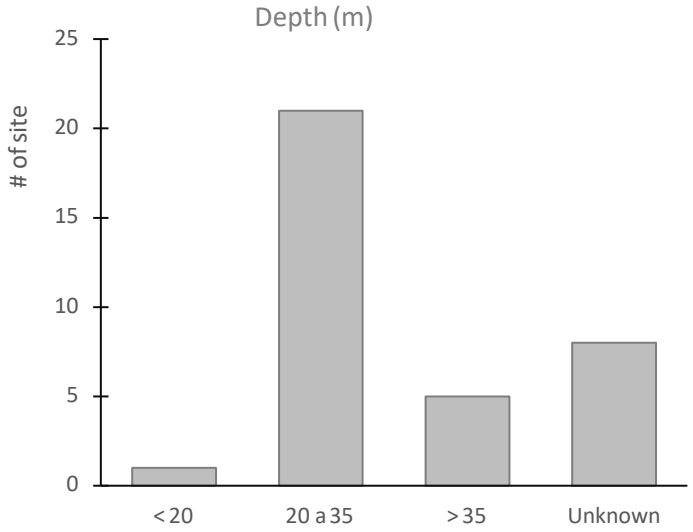
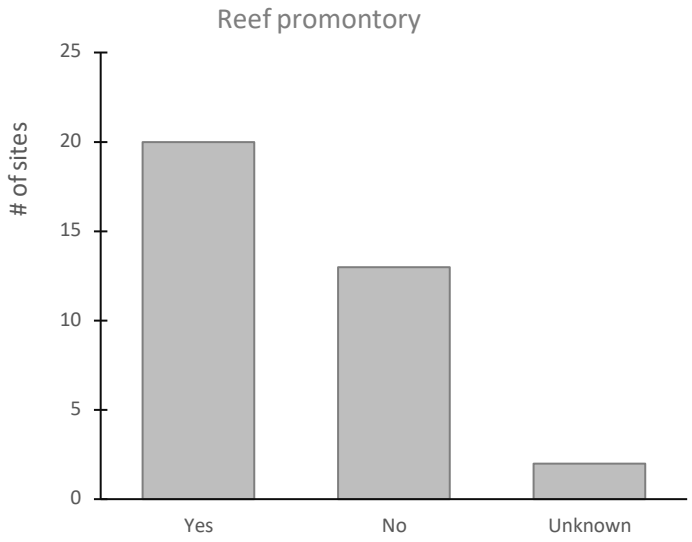
Protection status of FSA sites









Shifting baseline

The concept of a "shifting baseline" refers to the idea that *our perceptions and benchmarks about the state of an ecosystem or environment change over time.*

As generations pass, each accepts as normal and natural the levels of environmental degradation that exist in their time, regardless of what the environment was like in the past.

An Obituary for a Traditional Aggregation Site of Nassau Grouper in the Mexican Caribbean

Un Obituario para el Sitio Tradicional de Agrupación del Mero en el Caribe Mexicano

Une Notice Nécrologique pour un Site Traditionnelle de Regroupement de Merou des Caraïbes Mexicaines

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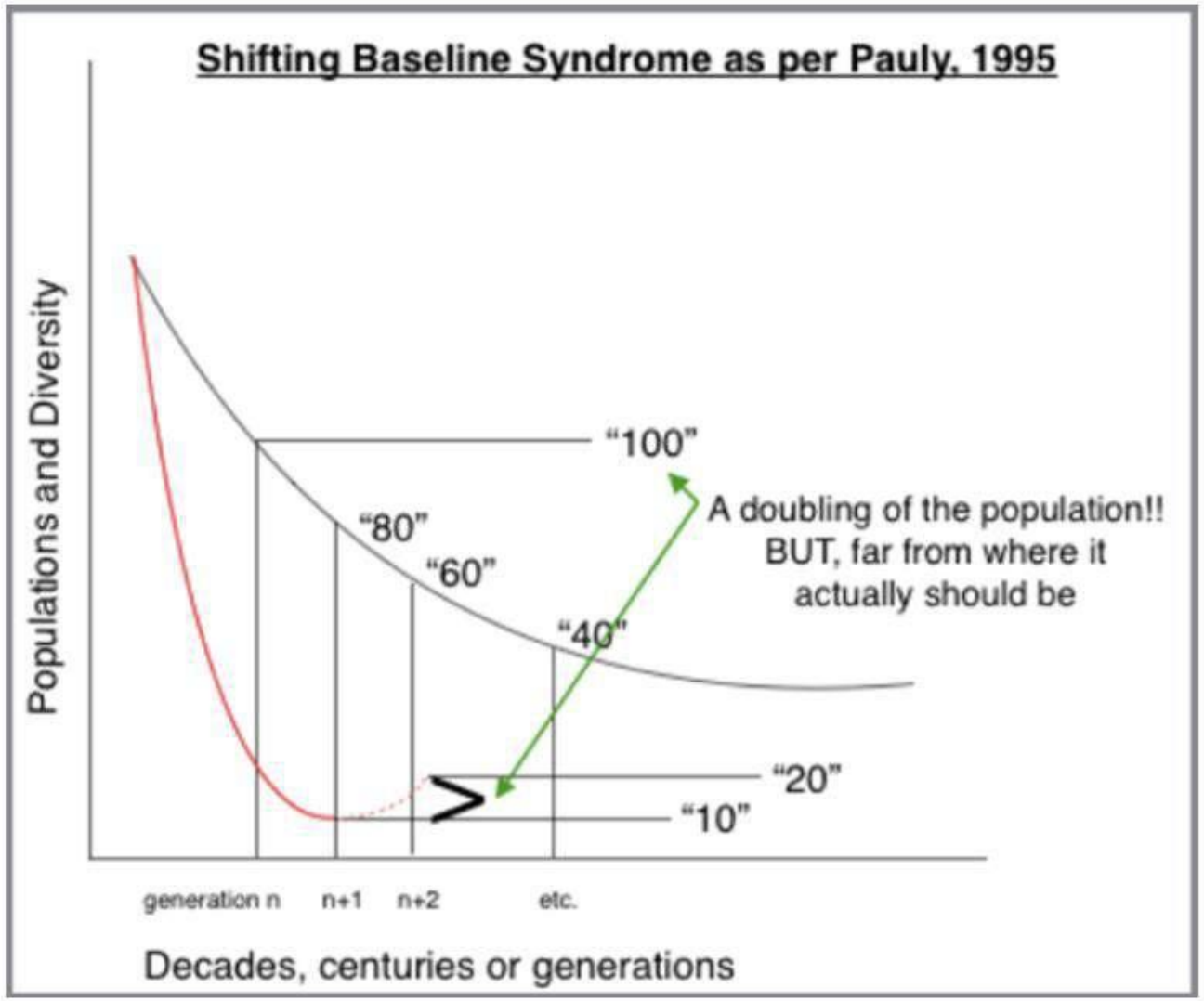

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ARTICLE

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Check for updates

Shifting baseline syndrome among coral reef scientists

Milton Muldrow Jr.[1✉], Edward C. M. Parsons[2] & Robert Jonas[2]

LETTER

Evidence for shifting baseline syndrome in conservation

S.K. Papworth[1], J. Rist[2], L. Coad[3], & E.J. Milner-Gulland[4]

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[2] Institute of Zoology and Imperial College London. Regent's Park, London NW1 4RY, UK
[3] University of Cambridge and Imperial College London, Department of Zoology, Downing Street, Cambridge CB2 3EJ, UK
[4] Department of Life Sciences and Centre for Environmental Policy, Imperial College London, Silwood Park, Buckhurst Road, Ascot, Berks, SL5 7PY, UK

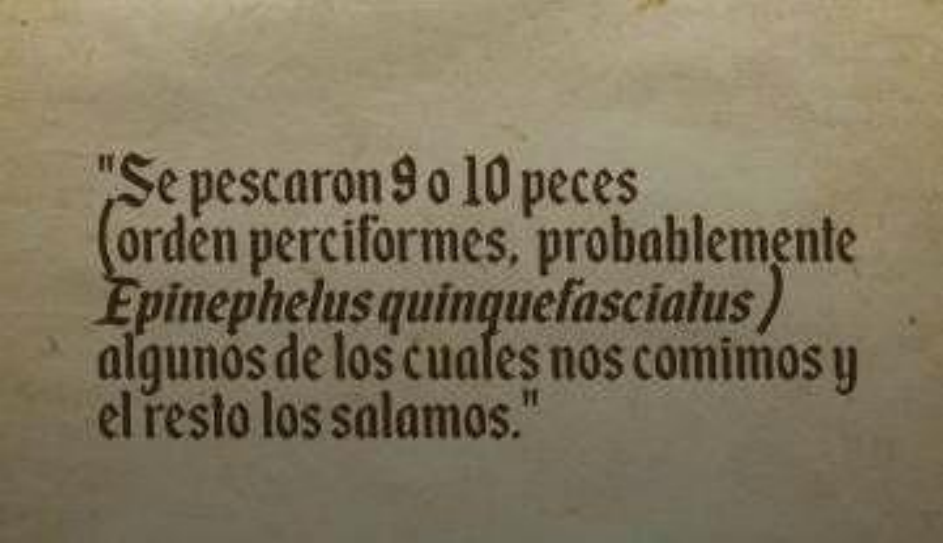
Shifting baseline syndrome highlighted by anecdotal accounts from snapper (Ocyurus chrysurus) fishery

"Algunos de los pescadores deportivos que pescan en aguas mexicanas no encuentran dificultad en pescar grandes cantidades de las abundantes cabrillas y meros. De hecho les resulta prácticamente imposible pescar algo mas a lo largo de las playas rocosas."

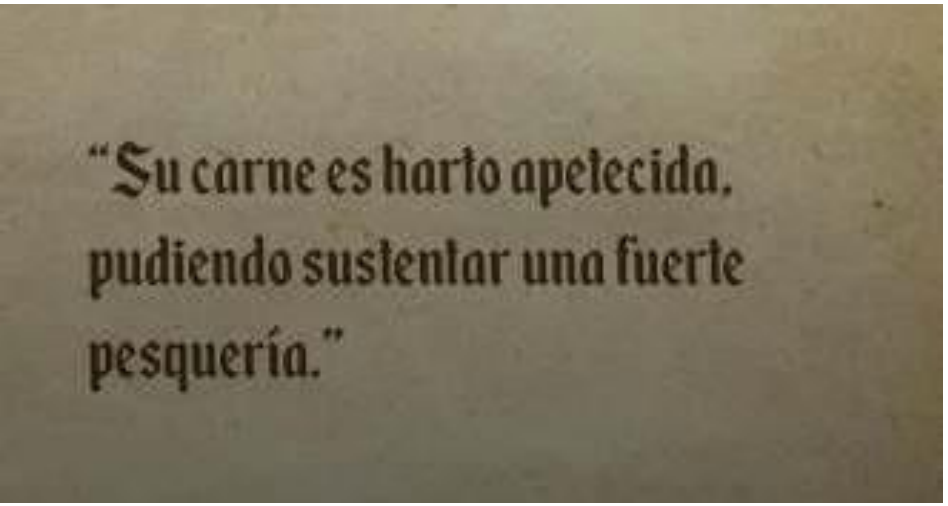
Richard Crocker 1937

"Se dificulta un poco obtener los peces debido a que con esta abundancia de peces, hay bastantes tiburones de talla grande que frecuentemente atrapan a todas nuestras presas."

James Colnett, 1798



William Dampier, 1697



Solis Ramirez, 1966

Preliminary Observations of the Spawning Aggregation of Nassau Grouper, *Epinephelus striatus* , at Mahahual, Quintana Roo, Mexico

ALFONSO AGUILAR-PERERA

Vol. 327: 289–296, 2006 | MARINE ECOLOGY PROGRESS SERIES Mar Ecol Prog Ser | Published December

Disappearance of a Nassau grouper spawning aggregation off the southern Mexican Caribbean coast

Alfonso Aguilar-Perera[1, 2,*]

191 0

Aggregation begins to be fished

1950

Aggregation becomes commercially important

1960

Spear gun becomes popular. >24 tons per season

1989

Aggregation in decline

2006

2014

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Institutional Amnesia: A Paradox of the 'Information Age'?

"while new information technologies have provided us with the ability to store, retrieve, manipulate and communicate more data, faster than ever before, at the same time many of our public institutions seem to be losing their memories"

Pollit 2000

The concept of "institutional amnesia" *refers to the loss or lack of institutional memory within an organization, institution, or government*. It involves the inability or unwillingness to remember and learn from history, past experiences, and lessons learned.

When an institution suffers from institutional amnesia, *it runs the risk of reinventing the wheel over and over again, without taking advantage of previous knowledge and experience.*

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PEOPLE NATURE | BRITISH ECOLOGICAL SOCIETY

PERSPECTIVE

Institutional amnesia pushes fish spawning aggregations towards extirpation

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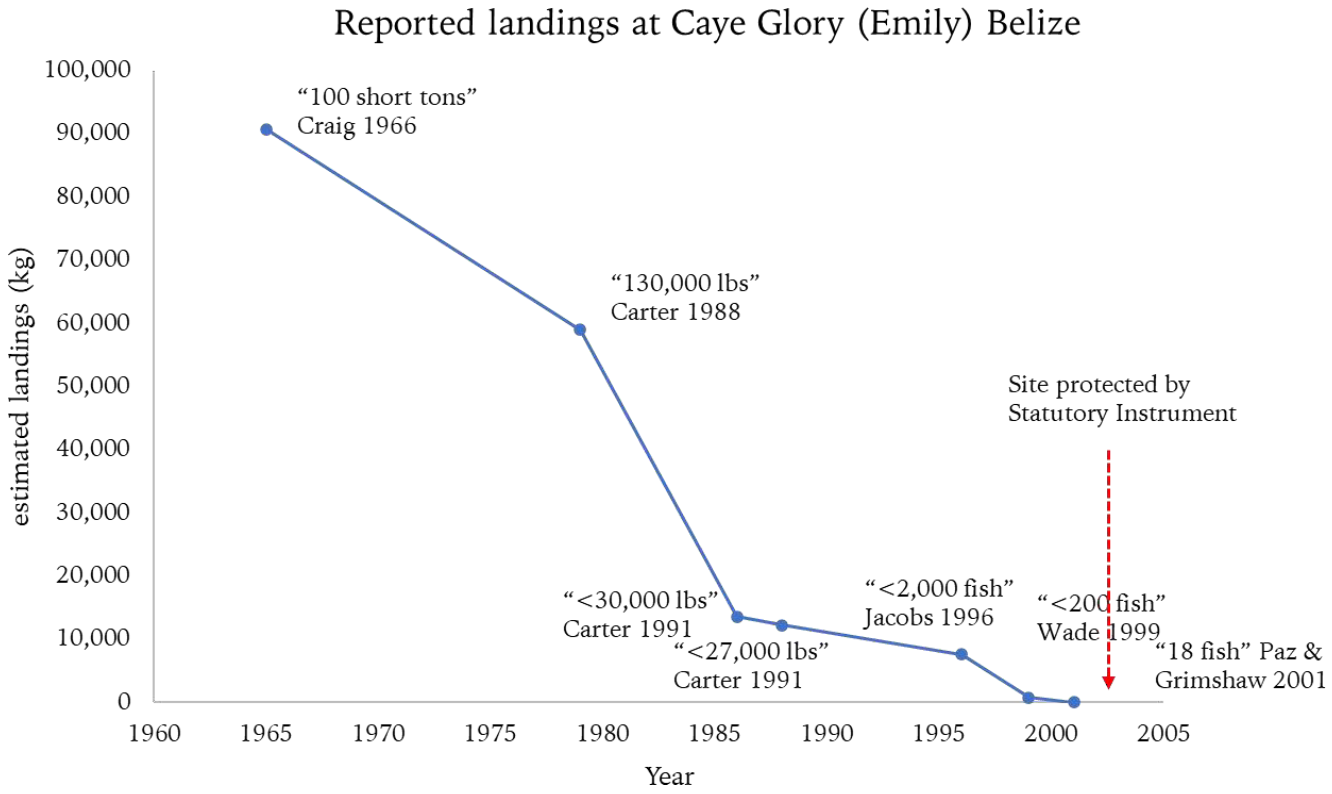
Handling Editor: Andrea Belgrano

Abstract

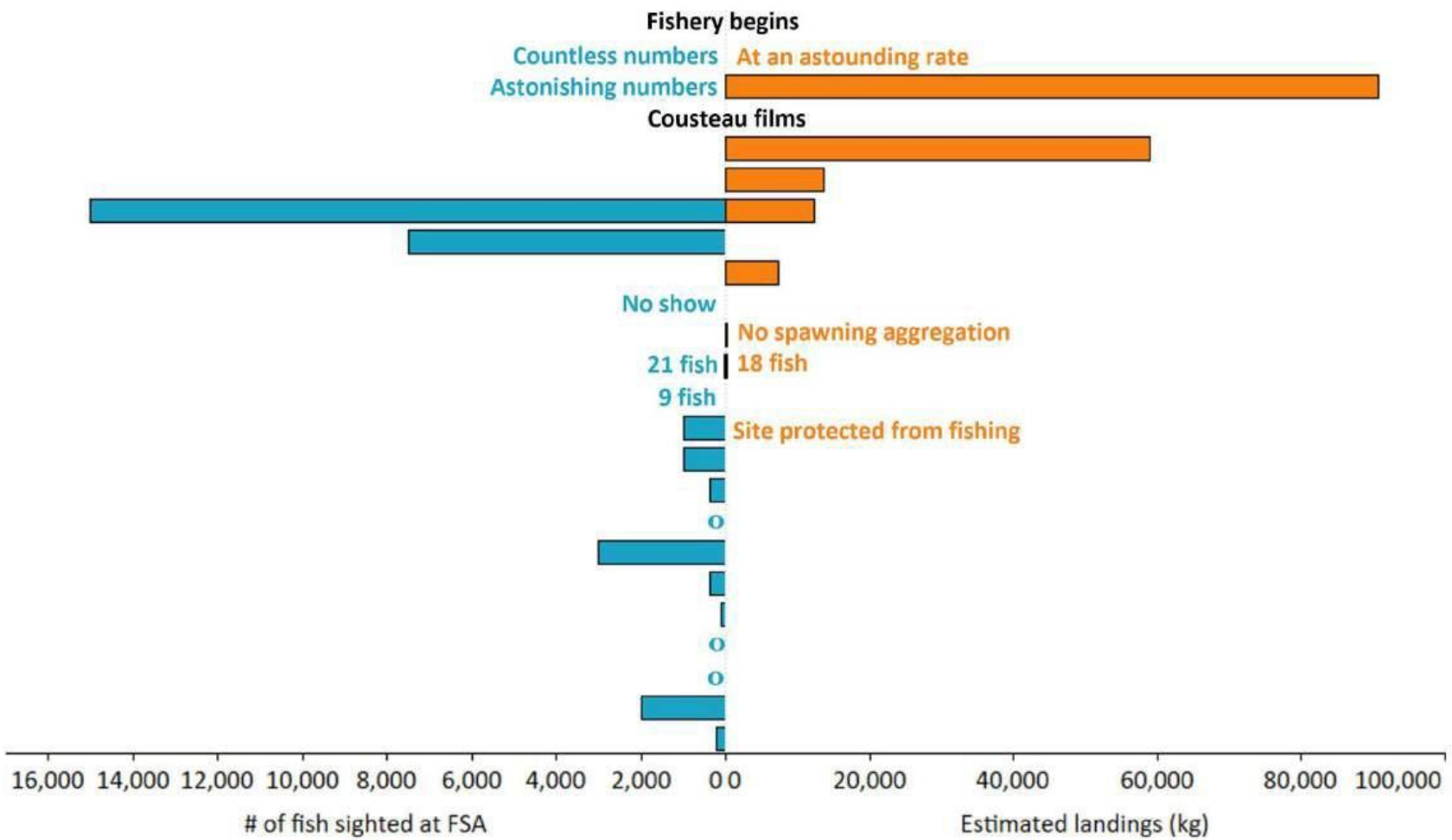
1. How institutions create and manage knowledge has been explored in the context of management and business science. However, little effort has been made to understand how, and why, these institutions forget what works or does not work, and no research in this field has been conducted in conservation or fisheries science.
2. This paper examines the concept of institutional amnesia by focussing a lens on fish spawning aggregations and efforts to monitor and protect them in the Mesoamerican Reef.
3. For over 20 years, underwater visual census survey data has been collected periodically at 36 spawning aggregation sites, and grey literature is available since the 1940's, yet managers and conservation practitioners report that abundance ten-

Why?

- In 2020, we interviewed managers (government and CSO) of marine reserves/FSA sites in the MAR.
- 36 grouper and snapper spawning sites in four countries.
- 30 fishing sites protected from fishing.
- **Managers reported that 48% of species abundance trends were "unknown."**
- In the places *they manage*.



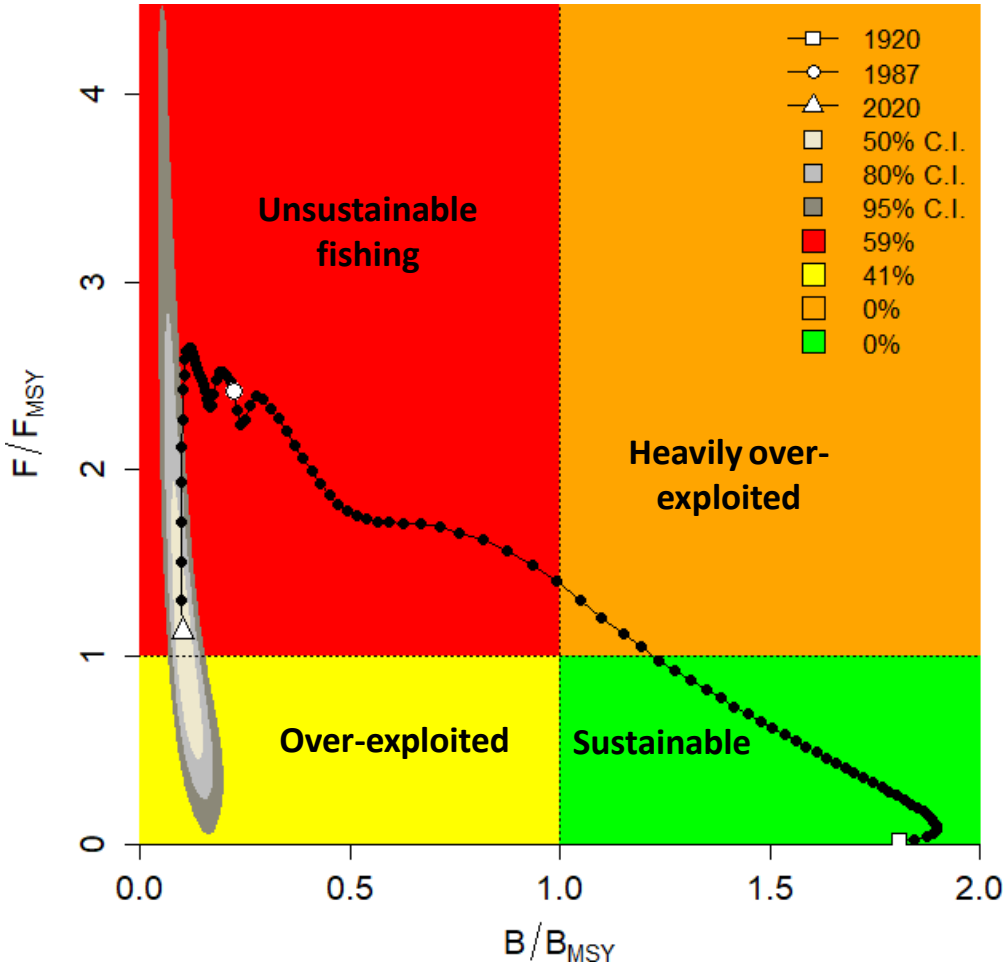
Year	Citation
1920	Craig 1969
1944	Thompson 1944
1964	Craig 1966
1975	Costeau 1976
1979	Carter 1988
1986	Carter et al 1994
1988	Carter 1988
1989	Carter 1989
1996	Jacobs 1996
1997	Paz and Trully 2007
2000	Sala & Ballesteros 2000
2001	Paz and Grimshaw 2001
2002	Heyman & Requena 2002
2003	Paz and Trully 2007
2004	Paz and Trully 2007
2005	Paz and Trully 2007
2006	Paz and Trully 2007
2007	Burns-Perez & Tewfik 2015
2011	Burns-Perez & Tewfik 2015
2012	Burns-Perez & Tewfik 2015
2013	Burns-Perez & Tewfik 2015
2014	Burns-Perez & Tewfik 2015
2015	Burns-Perez & Tewfik 2015
2019	Cho-Ricketts 2019



Nassau grouper (*Epinephelus striatus*) *"…too little, too late but possibilities for recovery"*

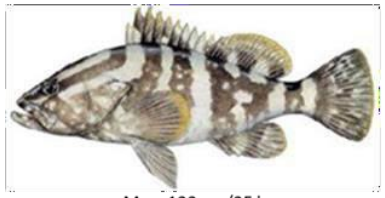
Background

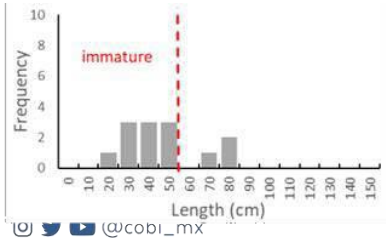
- In 1966, when the fishery had been active for over 40 years, it was reported that over 300 boats fished Caye Glory and over **90 metric tonnes** (200,000 lbs) were caught.
- Concerns around the fishery grew, with Jacques Cousteau, in 1976, saying, "*I think it would be very important to protect this area…*"
- Nassau grouper are currently listed as a critically endangered species by the IUCN.



Size limits adequate – in Belize

- Nassau grouper have to be *<u>landed whole</u>* when in season and measure *<u>more than 20 inches (50.8 cm) and less than 30 inches (76.2 cm)</u>* where Nassau grouper reach maturity at approximately 19 inches (48 cm), with the upper limit protecting the largest, most fecund mega-spawners, up to 122 cm in length.
- However, **very few fish are landed** (ranked 64th) and **often under sized** (inset).





I think it would be very important to protect this area against any [fishery] improvement as a way to protect the [livelihoods] of these fishermen for years to come… The area to protect is tiny, but it would be enough'
(Cousteau, 1976)

https://youtu.be/k09tlo0ME5o

What have we forgotten?

- "There are no data"
- "Monitoring doesn't work/data aren´t useful"
- "I didn't know"
- "I didn't read it"
- "I don't have the data"
- "It's good for me not to know..."

The Reality

- There is visual monitoring data since 2000.
- There are fishing data since 1960.
- There is an established monitoring protocol at the international level.
- There are dozens of scientific reports and papers.
- Belize has had a centralized database since 2005.

What can we do?

- Reduce staff turnover (difficult in NGOs and government)
- Improve the participation of local scientific institutions
- Strengthen local NGOs
- Improve the collection and management of information - documentation
- Storytelling

Regional recommendations

1. ***Regional coordination***: Fish spawning aggregations are cross-boundary resources. They must be managed as such, through international collaborations and effective dialogue and decision-making between governments, academics, fishers, and civil society.
2. ***Effective data management***: Data and knowledge loss has occurred over the previous decades due to personnel changes, siloed information, and poor data management. Regional digital ecosystems and repositories will reduce data loss.
3. ***Standardized and systematic monitoring***: Simple, robust, and systematic indicators for each spawning site should be available, while sensitive data should be protected to prevent overfishing. Standardized monitoring protocols and a regional database, information hub and dashboards should be made available.
4. ***Scientific principles and local knowledge***: Management tools should be based on the best scientific information available, effective design principles and always consider the traditional ecological knowledge of the local fishers.
5. ***Encourage participation***: Concerns in the conservation community about fishers "discovering spawning sites" must be overcome. Fishers already know the sites. Participatory processes encourage best practices and in the long-term help fill the void left by underfunded and overstretched managing agencies.
6. ***Adaptive management***: Climate change brings uncertainty. Management tools need to be continually reviewed over the coming decades.